

HTPB Propellant Response to Severe Impact

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The response of HTPB based 1.3 Propellant to severe impact conditions has been measured for propellant samples with diameters as large as 22". Shock propagation, radial expansion, air shock overpressures, and impact plate rebound velocities were monitored. The results show significant levels of energetic response for steel impact velocities above 600 ft/sec. Several tests were performed on samples emplaced below ground level to simulate the effects of confinement for loaded space booster propellant segments falling back to earth following a launch failure. The resulting combination of short time propagation of reactive shocks and much longer time deflagration response has been modelled in extended time reactive hydrodynamic simulations. Comparisons of experimental and calculational results demonstrate sufficiently close agreement such that important characteristics of propellant response can be described in some detail. Discussion is presented on prompt (near field) vs extended time (far field) effects.